
Massachusetts Maritime
Academy
Wind Turbine Project

Presented by: Paul O'Keefe
Rich Phelan

Wind Turbine at MMA

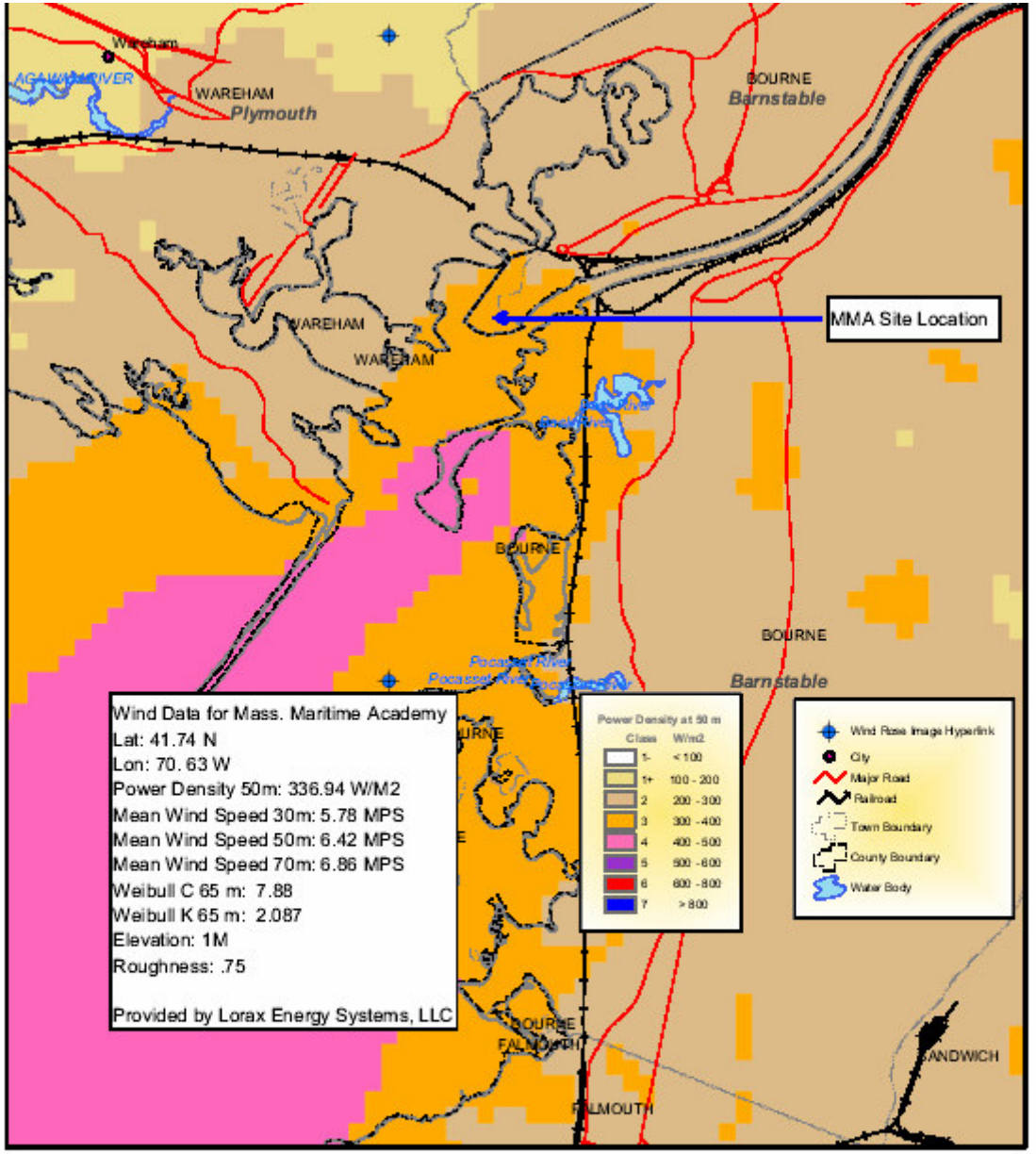
- Environmentally responsible
- No polluting emissions.
- Reduce emissions from existing power producers.
- Great student training in the greatest power growth market.
- Stabilize and reduce power cost.
- Positive financial impact in the first year.
- Potential for further expansion.

Concept Team

- Mass Maritime Academy
- Division of Capital Asset Management
- Massachusetts Technology Collaborative
- UMASS Renewable Energy Research Lab

Technical Feasibility Study

- UMASS RERL, Sally Wright
- Annual average wind speeds 6-6.5 m/s
- Fall zone 1.5 x the blade tip height
- Setback from residences 3.0 x the hub height (rule of thumb) 492 ft. for V-47



Wind Resource of New England

Sponsors

Connecticut Clean Energy Fund

Northeast Utilities System

Consultants

TrueWind Solutions

awsscientific

0 0.25 0.5 1 1.5 2 Miles

0 0.5 1 2 3 4 Kilometers

N

Projection: Transverse Mercator; Zone 19; Spatial Resolution of Wind Resource Data: 200m

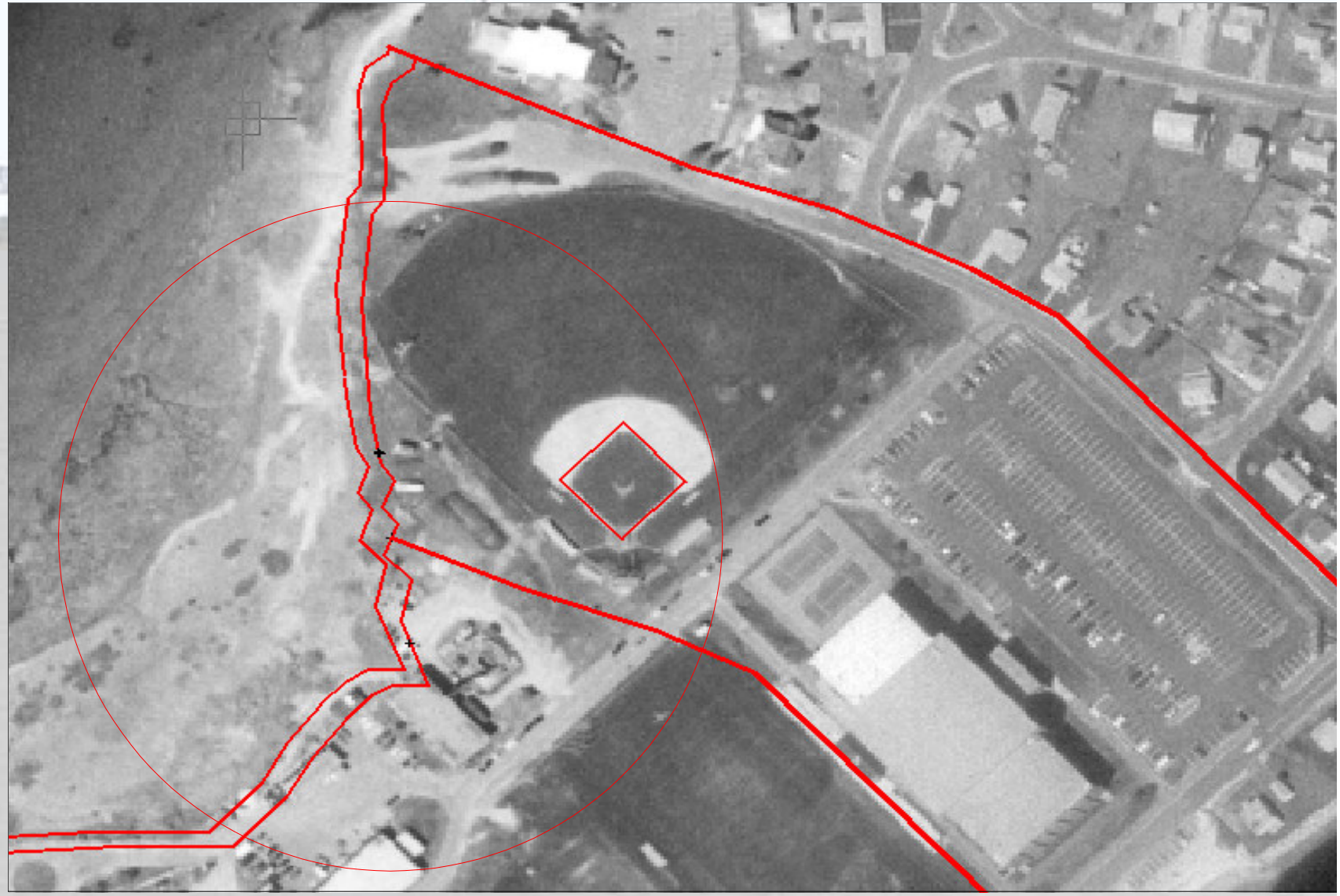
This map was created by TrueWind Solutions using the MesoMap system and historical weather data. Although it is believed to represent an accurate overall picture of the wind energy resource, estimates at any location should be confirmed by measurement. The map has been validated by the National Renewable Energy Laboratory (NREL) and consulting meteorologists using surface wind data.

Construction Team

- Division of Capital Asset Management
- Jay Cashman, Inc., General Contractor
- Energy Management Inc., Engineering
- ESS Group, Inc., Site Eng. & Permitting
- Solar Design Assoc., Electrical Eng.
- LeMessurier Consultants, Foundation Des.
- Mass Electric Construction, electric install


Proposed Turbine
Location

Upper red line delineates 3X hub height



Fall zone within circular area

V47-660 kW

Pitch regulated wind turbine with OptiTip® and OptiSlip®

	m	ft.
Hub Height	50	164
Blade Sweep	47	154
Blade Tip Height	73.5	241
1.5 X Tip Height	110.25	361.5
3 X Hub Height	150	492

Vestas

Project Cost and Savings

- Estimated turbine output 1,461,746 kwh or 28% of FY 05 campus consumption of 5,196,600 kwh
- FY 05 average $.115 per kwh to purchase power from NSTAR
- First year avoided cost of $168,100
- Projected 82% of power inside the fence
- Projected 18% of power sold to NSTAR or other

Project Cost and Savings

- Potential to sell 263,115 kwh to NSTAR or other@ $.05 per kwh = $13,155
- Potential to sell Renewable Energy Certificates @ .05 per kwh = (1,461,746 x .05) = $73,087
- Total project cost = $1,360,000
- Simple payback without REC's = 7.5 years

Permitting

- ESS Group reviewed potential environmental impacts
- Notice of Intent Filing required with the Bourne Conservation Commission
- FAA Notice of Proposed Construction required for structures over 200 feet
- State facility not subject to local bylaws
- The Uniform Building Code followed

Permitting

- Other analysis identified
- Noise Analysis, DEP guideline no more than 10 dB rise from minimum ambient noise level
- Visual Simulations show turbine installation from two vantage points
- Avian Impact Analysis

COHASSET NARROWS BRIDGE – Existing view from Cohasset Narrows Bridge looking south

COHASSET NARROWS BRIDGE – Proposed view from Cohasset Narrows Bridge looking south

ESS Group Inc.
Engineers
Scientists
Consultants

MASSACHUSETTS MARITIME ACADEMY
Bourne, Massachusetts

Source: ESS, Original photograph taken 8/4/05 – 2:35 PM

Turbine Simulation
(Cohasset Narrows Bridge)
Viewpoint 1

Figure
2

FISHERMAN'S COVE ROAD – Existing view from 16 Fisherman's Cove Road looking east

FISHERMAN'S COVE ROAD – Proposed view from 16 Fisherman's Cove Road looking east

ESS Group Inc.
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MASSACHUSETTS MARITIME ACADEMY
Bourne, Massachusetts

Source: ESS, Original photograph taken 8/4/05 – 1:30 PM

Turbine Simulation
(Fisherman's Cove Road)
Viewpoint 2

Figure
3

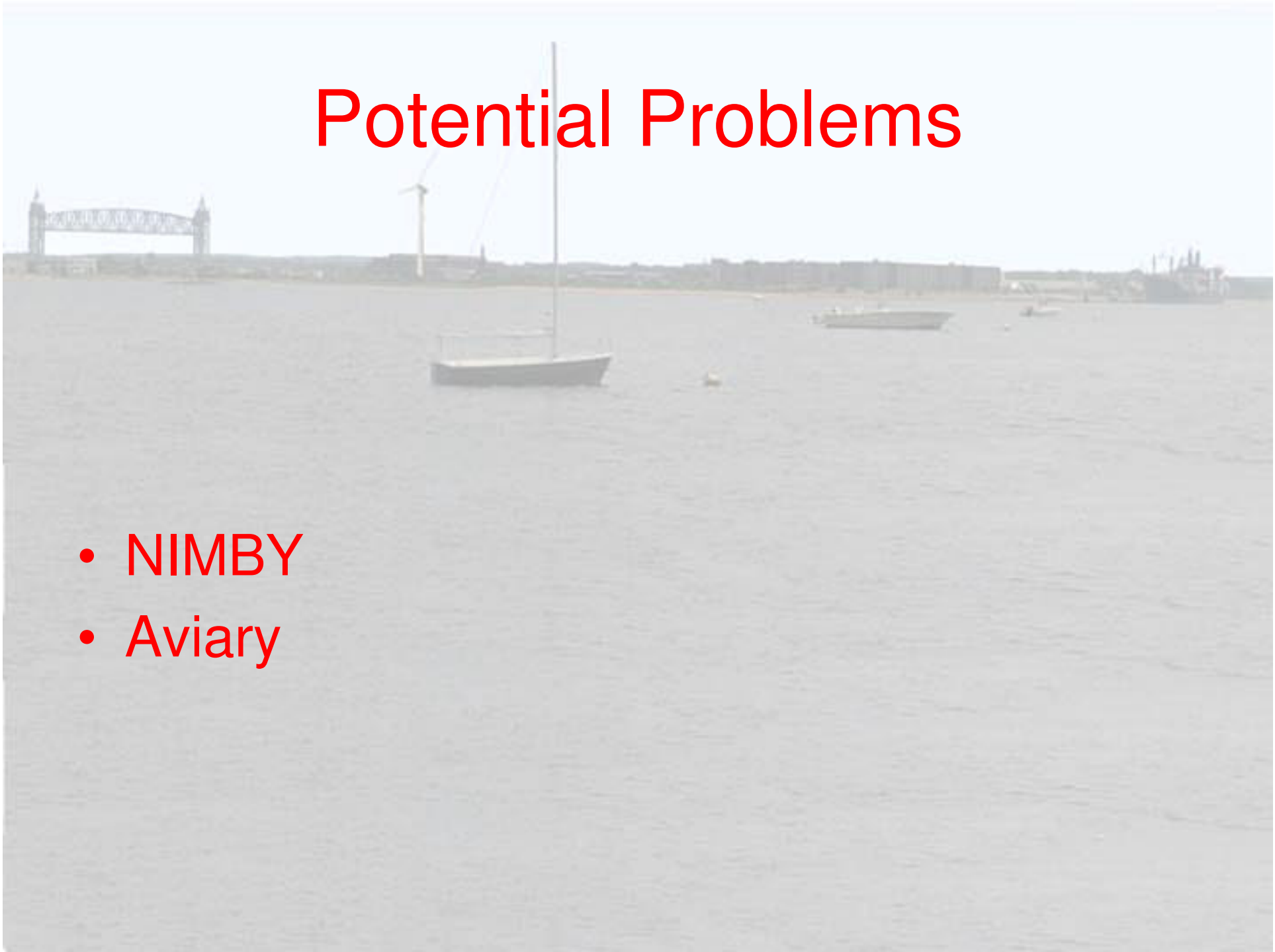
Electrical Interconnection

- Standards for Interconnection of Distributed Generation MDTE approved tariff
- Expedited/Standard Process Application fee $3 per kw….$1980
- NSTAR Impact Study….fee $7250
- additional protection needed $20-$30k

Local Outreach

- Front page articles in a major and local newspapers
- Discussion on local radio show
- Discussion with Town of Bourne Selectman
- Newspaper and radio exposure yielded no negative calls to MMA

Potential Problems



- NIMBY
- Aviary

Future Projects

- Stationary fuel cell for pool heating
- Marine fuel cell in training vessel
- LEED certification for Dormitory Expansion
- PV opportunities
- Solar hot water opportunities in dorms